SOME ACCOUNT OF THE AGRICULTURAL DEPARTMENT.

The Organization and Work of the Farmers' Branch of the Government -Mr. Saunders's Reminiscences of His Long Service.

Mr. William Saunders delivered an ad dress in Boston on Tuesday before the National Grange of the Patrons of Husbandry on the history and organization of the United States department of agriculture, with which he is connected as chief o the horticultural division. After referring to the work on behalf of agriculture for merly done by the patent office, he elted the main provisions of the act of May, 1862, by which the department of agriculture was created, and stated that in the per-formance of the duties imposed upon the commissioner of agriculture by that act and in the gradual colargement of the range of the operations of the department a body of assistants had been organized which now embraced a working force of nearly 400 persons-specialists, clerks, laborers, and other employes. "This working force," said he, "is systematically arranged in divisions, each one of which is directed by a responsible head. These divisions are the seed division, the entomological division, the horticultural, pomological, and propagating division, the statistical division, the botanical division, the microscopical division, the forestry division, and the veterinary division. Through those divisions the commissioner is enabled to execute the various duties prescribed and contemplated in the organic act creating the department, as approved May 15, 1862."

The SEED DIVISION. ing force," said he, "is systematically ar-

THE SEED DIVISION. Treating first of the seed division, he said: "The primary object of the distribution of seed is to give increased value to production, to introduce new industries, to establish principles in regard to climate influences on seed races, and from these deduce facts which would point to the best geographical distribution of varieties, and more rapidly introduce the best varieties of seeds of farm and garden plants into new states and territories."

seeds of farm and garden plants into now states and territories."

He spoke of the value of the results often obtained from procuring seed grown in a climate or on soil favorable to its highest perfection, showing that for a number of verrs such seed would continue to yield large crops after being placed under less favorable conditions. In illustration of this point, he mentioned a case in which 260 bushels of outs grown in the north of Europe, and weighing fifty-one pounds to the bushel, were imported for distribution in this country, and produced crops which, in this country, and produced crops which as regards both weight of grain and bushel in this country, and produced crops which, as regards both weight of grain and bushels per acre, were far above the ordinary yield of onts in the localities in which they were sent. Similar results were obtained from the distribution of Fultz wheat, which in some cases yielded over twice as much as the common wheat of the locality, growing in adjoining fields. A further important object of seed distribution, he said, was that of quickly testing the merits of new or valuble seeds in different parts of the country and on a diversity of soils. He stated that under resolutions of Congress requiring that two-thirds of all seeds for distribution should be equally divided among the members of that body, seeds had in some cases been sent to places where they could be of little value, as in the case of cotton being sent to Maine; but these provisions have since been amended, so that the commissioner can now exercise his judgment as to the localities in which seeds can be used to the best advantage.

his judgment as to the localities in which seeds can be used to the best advantage.

THE ENTOMOLOGICAL DIVISION.

The division of entemology was established in 1863, but for some years only 82,000 per annum was appropriated for its support and its range of work was consequently very limited. Since 1878, however, it has been gradually increasing in extent and usefulness, the appropriation for this year being upwards of \$50,000. The importance of this division, he said, became apparent on considering the vast number of insects—which are said to outnumber of insects—which are said to outnumber of insects—which are said to outnumber of insects awayers. To learn how this great loss may be averted or reduced to a highing insect ravages. To learn how this great loss may be averted or reduced to a highing direct and careful inductive research, carried on sometimes for many years.

Besides considering how noxious insects may be destroyed, this division gives a part of its attention to insects of a useful character, and now embraces a section of beculture and another of slik culture, while a section of economic ornithology has also been established with a view to making researches into the habits of birds, and their special value to special crops; and to all kinds of analyses which are most intimately associated with the progress of agriculture, and the properties of analyses of grasses, forage plants, and terming the value of the investigations made by the division in reference to the examples of grasses, forage plants, and terming the value of the investigations made by the division in reference to the examples of grasses, forage plants, and their special value to special crops; and to all kinds of analyses which are most intimately associated with the progress of agriculture, and their special value to special crops; and to all kinds of analyses which are most intimately associated with the progress of agriculture.

In the case of special value to spe

acter, and now embraces a section of bee culture and another of silk culture, while a section of economic ornithology has also been established with a view to making researches into the habits of birds, and their relation to is sects and to agriculture. As an illustration of the practical character of the work of this division, Mr. Saunders referred to the present general use of the kerosene emulsions which have emanated from it in recent years, and their applicafrom it in recent years, and their applica-tion by the improved cyclone-spray-nozzle. This important advance in our knowledge, he said, has given us the means of successhe said, has given us the means of successfully and economically protecting our orange groves from their worst troubles—rust and scale insects—while the improved methods of using the arsenical insecticides and pyrethrum powders has given us such mastery over many of the worst insects that some of our chief crops like cotton, potatoes, cabbage, and most of our fruit and shade trees are easily and cheaply protected. Great advances have lately been made in this line, and the department has kept the lead in it. kept the lead in it.

THE HORTICULTURAL DIVISION. In treating of the division of horticul In treating of the division of horticulture, pomology, and plant propagation he
stated that Chinese sorghum or angar cane
was introduced and first grown in this
country in 1855 in a garden established
under the auspices of the patent office, the
Chinese potato or yam being also lutroduced during the same year. In 1862 this
garden was transferred to the newly-formed
department, and enlarged both in area and
range of operation. The objects proposed
in the organization of this division, as set
forth in the first annual report of the superintendent, were stated as follows: "To
procure and encourage the transmission of intendent, were stated as follows: To procure and encourage the transmission of seeds, cuttings, bubs, and plants from all sources, both foreign and domestic, for the purpose of testing their merits and adaptation in general, or for particular localities in the United States; to procure, by hybridizing and special culture, products of a superior character to any now existing; to ascertain by experiment the influences of varied culture on products, and the modifications effected by the operations of pruning and other manipulations on trees and fruits; to investigate more thoroughly the various maladies and diseases of plants, and the insects which destroy them; to provide ample means for thoroughly testing samumple means for thoroughly testing sam-ples of seeds and other contributions that ay be received; to cultivate specimens of the various hedge plants, so as to exhibit their availability for the purposes of hedges; to cultivate a collection of the best fruit trees availability for the purposes of hedges; to cultivate a collection of the best fruit trees and planta, such as grapes, apples, pears, peaches, strawberries, raspberries, currents, &c., so to compare their respective merits and preserve their proper nonenclature; to plant a collection of choice shrubs and trees adapted for decorating gardens and landscape scenery; to creek glass structures for the two-fold purpose of affording the occassary facilities for cultivating exotic fruits and plants, and to furnish examples of the best and most economical modes of constructing, neating, and managing such buildings."

These objects, he said, have been very closely adhered to during the past twenty years or more, some having been successfully carried out, and others only partially so. The formation of a collection entiracting all procurable varieties of native grapes, the establishment of a plantation of pear trees, comprising sixty varieties; the introduction of a collection of apple trees from Russia, about 1870, and the growth of specimen hedges formed by more than a dozen different kinds of plants, with the results

Russia, about 1870, and the growth of specimen hedges formed by more than a dozen different kinds of plants, with the results of observations and experiments connected therewith, were presented in some detail. After the transfer of the garden to its present location in 1899, and the construction of sailable conservatories for the propagation and preservation of exotics, a collection of economic plants was commenced, which in a few years was pronounced superior to any other such collection in existence. This was strictly confined to plants which furnish dyes, sugars, starches, oils, gums,

fibers, beverages, edible fruits, and medici-nal products. Any of these which gave promise of successful culture in any por-tion of the country were propagated and distributed in districts where they were the most likely to succeed. An arisoretum was planted in 1871 and 1872. This comprises atout twenty acres, and was designed to include one specimen plant of every tree and shrub hardy enough to stand the climate.

climate.

Some fifteen years ago a special agent
was employed in Europe to collect everytiding valuable belonging to the citrus famity, and the collection then made has since ining valuatic belonging to the citrus ramity, and the collection them made has since been increased by importations from various countries, including the West Indies, South America, and Japan. As evidence of the value of the efforts of the department in this direction he quoted from a letter received about a year ago, in which the writer said: "The Babia orange sent to California ten years ago is conceded to be the best variety produced in the state. It is of the largest size and finest flavor, and sells higher than any other kind. It is worth to California all that the department of agriculture has ever cost the country."

Among the numerous plants which have been subjects of special attention, he mentioned the Japan persimmon, which was introduced first in 1894, and is now attracting attention in localities where it succeeds, and bids fair to become of considerable commercial value, especially in the southern states.

In regard to the work of the statistical division Mr. Saunders said:

"The statistical work of the department has a wide range, and includes the indications of production before barvest, from local investigation of area and condition of crops, and a record of results afterwards. It reports the prices on the farm and in the principal cities, the cost of transportation to home and foreign markets, the stocks on hand, the requirements of consumption, and

to home and foreign markets, the stocks on hand, the requirements of consumption, and the sources of supply, as adds in calculating the probable demand and prices.

"Its work includes the collection of all facts bearing on production, distribution, consumption, price, cost, and profit. It requires the consideration of all official and commercial records that relate to agriculture or its products; to lands and their value; to labor and its wages; to results of experiments, and the application of theory experiments, and the application of theory and science to practice; to the manufacture, distribution, and value of commercial for-tilizers; to any facts that illustrate rural economy or tend to improvement and profit

in rural practice.
"In this work there are engaged the "In this work there are engaged the statistician and sixty-four clerks in the department; antisfical state agents for special statistical work in the several states; a foreign agent, resident in London, who obtains information concerning European products; a corps of correspondents in over 1.500 counties in the United States, with three essistants, making a force for local observation and including the correspondents of the state agents, about 10,000 persons contributing to this branch of the service.

"These correspondents are appointed with reference to their facilities for obtaining and including the correspondents of the state agents.

with reference to their facilities for obtaining authentic information and their ability issure impartiality and accuracy.

"They are informed, monthly, by circular letters, in regard to the specific duty required, and the answers are returned in accordance with transmitted instructions. The acknowledged value of the accuracy of data thus obtained clearly proves the excellence of the system adopted."

The aim of the efforts of this division was stated to be "to give accurate information."

The aim of the efforts of this division was stated to be "to give accurate information to the producer that will enable him to protect himself against the deceptions of the speculator, and guide him to the produable distribution of his cropping, to avoid as far as possible a glut and low prices, and to enable him to supply a growing and profitable demand; to show him the cost of reaching the markets of the world and the prices prevailing in those markets." THE CHEMICAL DIVISION.

The work of the chemical division is di-

the country.

Mr. Saunders stated that as far back as

Mr. Saunders stated that as far back as 1857 the Chinese sugar cane, or sorghum, was subjected to chemical tests which showed that to obtain crystallizable sugar the plant should be cut at that stage of its growth when the seeds were thoroughly ripened and the leaves had changed color, the expressed juice then yielding over 16 per cent of thick strap which crystallized almost wholly into cane sugar. Notwithstanding these promising results, many difficulties seemed to connect themselves with the extraction of sugar from the juices of the cane. For several years after 1862 the work of experimenting was continued with more or less of vigor, still the production of sugar was spasmodic and unsystematic. About 1873 the department, by experiments in the laboratory and in the factory, gave fresh impetus to the work, encouraged an increased culture of the plant by extensively distributing seeds of improved varieties in every section of the country, which has been the means of furnishing valuable information relative to the sugar value of the plant in different regions and under different elimates.

The continued laboratory experiments by the chemical division contributed to a better understanding of the mature of the substances contained in the juicee of the plant, and to the best methods of removing those inlimical to crystallization.

During the past three mouths a notable

and to the best methods of removing those inimical to crystallization.

During the past three months a notable advance has been made by this division in the extraction and manufacture of sugar from sorghum cane. These experiments have shown that the process of diffusion extracts nearly all the sugar from the cane and secures a yield from 20 to 40 per cent. greater than by the old method of crushing.

This process consists in cutting the canes into thin chips and then extracting the sugar by means of warm water.

Into thin chips and then extracting the sugar by means of warm water.

The division has also tried the process of carbonatation for the clarification of the juice, which yields results in every respect superior to those furnished by the old processes, while saving the time and labor of seumning. From trials of these processes already made it has been demoustrated that the sugar produced in this country may be increased fully 30 per cent. without increasing the area under cultivation. The account of this division was concluded with a reference to its work in recluded with a reference to its work in re-gard to the production of beet sugar on the Pacific coast and its investigation on the idulteration of foods.

THE DIVISION OF BOTANY.

The Division of Dotany.

The botanical division was established in 1823. It is charged with the care and enlargement of the herbarium, the publication of botanical matter, the determination of all plants and specimens of plants sent for name, and all that relates to educational institutions and special workers in regard to co-operation in botanical science, and its practical application to carrierline. The herbarium contains botanical specimens of all the plants in the United States, so far as they are procurable, and also many foreign plants. The objects and uses of the herbarium, both scientific and practical, were briefly stated, and the objects kept in view by the division in its work and reports were set forth in detail. "It is probable," said Mr. Saunders, "that a careful study of the nailve grasses of peculiar regions will discover kinds suitable for the wants of grazing and forage in districts where the ordinary and popular species of grasses now in cultivation do not succeed. Many inquiries relate touseful fibrous and medicinal plants; also to plants which in some sections of the country poison eattle and horses which cat the perulcious herbage, and thus cause serious losses to farmers and stockmen, All questions referring to practical and economic botany are intrusted to this division."

valuable pamphlet on 'The Agricultural Grasses of the United States' was published and distributed by the department. During the early portion of the present year the botanist prepared a "Descriptive Catalogue of the Grasses of the United States," intended in part to be explanatory of the display of grasses made at the New Orleans Exposition, which was published and widely disseminated. This catalogue contained both scientific and practical information on the subject, and has been highly commended by competent authorities. Another very important work begun by this division hast year relates to the medicinal plants of the United States, which are described and illustrated by plates.

plates,
THE MICROSCOPICAL DIVISION. THE MICROSCOPICAL DIVISION.

After alinding to the work of this division in investigating fungi which infest plants, the mildew of the grape, the rot of the potate, black-knot of the cherry and the pean, the twig blight of the apple and the pean trees, the yellows of the peach, the rot or so-called sun-scald of the cranberry, the blight of the orange tree, the rot or speck of the fruits of apples and pears, and other diseases of fruits and plants, Mr. Saunders referred to some recent discoveries of the microscopist in respect of the characteristics of various animal fats. The investigation of this aubject originated in the endeavor to discover some well defined mode by which pure butter could be distinguished from olcomargarine, butterine, and other butter substitutes, so as to protect the public against the purchase of

and other butter substitutes, so as to pro-tect the public against the purchase of freadulent compounds which are frequently sold instead of pure butter.

After numerous experiments the micro-acopist found that lard from swine fat, if heated and allowed to cool slowly, pre-sented peculiar crystals; the fat of beef also showed crystals of a form differing from those of lard, while pure normal dairy but-ter is wholly exempt from fatty crystals; and these distinctions are constant.

nd these distinctions are constant.

But when pure butter is bound for a few econds only, and allowed to gradually cool seconds only, and allowed to gradually cool for a certain period, it becomes crystalized, and when these crystals are subjected to polarized light, in connection with the microscope, they exhibit a well-defined cross, similar to the letter X, thus distinguishing lutter from lard or beef fat. These experiments and results have been repeated by chemical and other experts, who agree in the statement that undoubtedly butter may now be distinguished from all other fatty mixtures. Successful convictions of fraufulent dealers have already been made in consequence of the development of these facts.

INE FORESTRY DIVISION.

In speaking of the forestry division, which was established in 1877, he alluded to the relation of forests to the temperature and moisture of the air and to the regulation of the flow of water in streams, remarking that, whether the amount of rainfall is influenced by forests or not, the undue denudation of a country of its timber undoubtedly increases destructive freshets and dries up flowing springs. He went on to state that the forestry division is employed in spreading abroad these and other facts regarding the relation of forests to agriculture. By careful inquiry it is endeavoring to ascertain the extent and distribution of forests in the country, to learn where they are so attended and give place to grain fields and pastures, and where they are so scarce that trees may profitably be planted. It is endeavoring to attract attention to the great variety of trees which abound in this country; to show the economic and practical uses of our various woods. It is each THE POBESTRY DIVISION. variety of trees which abound in this country; to show the economic and practical uses of our various woods. It seeks to promote an appreciation of the value, as well as the beauty, of trees. It would show how to make the forests more profitable than they now are, and also show how tree culture may be, in many sections of the country, as profitable as any other crop. It would encourage tree planting in cities for their sanitary value; in city parks and school-house grounds for their shade and tenuty; around the country home, and in every place where their presence would tend to make life more pleasant and happy.

THE VETERINARY DIVISION. The veterinary division was established a The veterinary division was established a few years ago, but is now merged in the bureau of animal industry, established in May, 1884, for the purpose of preventing the exportation of diseased cattle and providing means for the suppression and extirpation of pinero-panemonia and other contagious diseases among domestic animals. After describing the work of this bureau in inspecting herds of cattle and carcasses in the cast and giving the results of its investigation, Mr. Saunders said:

"Prior to the catablishment of this bureau it was not known that pleuro-pneumonia

"Prior to the establishment of this bureau was not known that pleuro-pneumonia existed in any part of the United States west of the Alleghany mountains, but in August, 1884, it was discovered in the state of Illinois. An investigation revealed a very extensive and serious outbreak, involving herds in Illinois, Ohio, and Kectucky. Prompt measures were at once taken to prevent the further spread of the discass and secure its eventual extirpation. disease and secure its eventual extirpation. In the states of Ohio and Hilmois, where the souri, where a most serious and extensive outbreak was discovered in January of this year, the disease is believed to have been

tirpated.
The law, as it now exists, is considered to

The law, as it now exists, is considered to be very defective. It does not provide for the shoughter of diseased and infected animals, and only authorizes such quarantine measures as may be necessary to prevent the spread of contagious diseases from one state or territory to another.

The scientific investigations relating to the nature of communicable diseases, and the means of preventing and combating them, are carried on in the laboratory, where the contagia are studied, and at the veterinary station of the department, where animals of different kinds are kept for experiment.

animals of different kinds are kept for experiment.

The results of these experiments have already thrown much light upon the nature and cause of contagious maladics incident to domestic animals.

After noticing the important work of the bureau in investigating the nature of swine plague or hog cholers and Texas fever, and in mapping the regions in which the latter prevails, Mr. Saunders states that on July 1, 1884, the management of the quarantine station for imported cattle was transferred from the Treasury Department to the department of agriculture, and has become a part of the duties of the veterinary division. Stations are maintained at the ports of Bospart of the duties of the veterinary division. Stations are maintained at the ports of Boston, New York, and Baltimore, and arrangements have recently been made by which animals arriving at San Francisco are also quaranticed. Although this is the infant division of the department, it gives promise of great value to the live-stock producing interests of the country.

The pen is mightler than the sword, and nuch of the wealth of this country is due to he hog pen. St. Jacobs Oll has been found to ea cure for hog cholera.

Bo Campaigns Pay Newspapers.

(From the Cedar Rapids Republican.)

Many have an idea that campaigns are immensely profitable to daily newspapers. This is a mistake. They are a drain and not a profit. The excess of campaign material compels additional expense in composition and in telegraphing. The partisan nature of much that appears in print during a campaign paper unturally draws the party line through the paper's constituency of readers; and while the list of subscribors increases in one direction, it decreases in readers; and while the list of subscribers increases in one direction, it decreases in the other. At the close of a campalga every Republican paper gets back Democratic readers whom it locaes during the campaign. Another campaign loss to newspapers and newspaper offices comes from the partial congestion of business consequent upon the diversion of public interest from trade to polities. No, the vast deal of extra work and expense incident to a campaign is not offset by the additional receipts of a campaign. The profit of a newspaper comes from its constituency of regular subscribers and advertisers and from the surplus advertising which accompanies activity in business circles.

Seventh of a Series of Articles by Charles J. Kintner, Chief of Division of Electricity, United States Patent

As early as 1803 a German physicist named Ritter, discovered that if two dis-connected plates of the same metal were immersed in a solution of hydric sulphate, and connected respectively to the poles of common voltale battery, oxygen would be evolved at one of said plates and hydrogen at the other through electrolytic action upon the solution, and that upon disconecting the voltaic battery, and then con pecting the two plates in a metallic circuit through a gaivanometer, a current of electricity would flow from the anole, or pole last connected to the positive pole of the charging battery, to the cathrode or pole last connected to the negative pole of said charging battery.

The primary or charging battery by electrolytic action decomposes the hydric sulphate into its constituent gases, oxygen and hydrogen, the oxygen remaining at the succle or ingoing electrode, while the hydrogen goes to the cathode or outgoing electrode. stine the two plates in a metallic elecuit

This creates a difference of potential such

that on disconnecting the charging battery and connecting the plates the process of recomposition takes place between the gases, and as a result electricity is generated.

Just here let us disabnae our readers' mirds of a prevailing idea, that in a storage battery electricity is stored: Electricity is never stored, unless we consider statical or bound electricity, held by virtue of constant electrical pressure or tension to be of this nature as, for instance, charged condensers, such as Leyden lars.

When we speak of storage batteries we simply mean batteries in which potential or energy is stored, which potential when put in action by Johning the electrodes can generate electricity. In the battery of Ritter the potential or energy less in the oxyen or hydrogen bound or retained in or by the metal plates.

No further progress was made in this line of apparatus until about 1850, when Grove increased it by arranging over the electrodes retaining vessels for collecting the escaping oxygen and hydrogen gases.

This improvement is known as Grove's gas battery, and is of little value except as a scientific curiosity.

It was not until 1850 that Gaston Plante, an eminent French physicist, invented a storage battery of actual value. It consisted of two lead sheets separated by insulating material in the nature of rubber strips, the sheets being rolled upon each other. These sheets were connected to the charging battery, as were the plates of the Ritter battery, after having been immersed in a liquid of hydre sulphate. The action then is electrolytic as before, lead peroxide (Ph O2) being formed on the anode plate attached to the positive pole of the battery by the action of the liberated oxygen upon the lead of said plate, while the liberated hydrogen goes to the cathode or plate connected to the negative pole of the battery and tends to precipitate lead in a metallic state upon said plate. The cathode is in this manner covered with a rough granular surface, while the anode assumes a brown color, due to the peroxide co

after both plates have become thoroughly peroxidized or made spongy. Each charge deepens the peroxide sponge until, after a long and tedious series of charges, discharges, and reversals, as indicated, the plates become coated to a sufficient depth to retain heavy charges of oxygen and hydrogen gases, and hence maintain sufficient potential to be available for useful purposes. It will be understood that this spongy peroxide gives an increased surface to the plates to maintain the oxygen and hydrogen gases when liberated in increased quantities. The tedious and expensive process of "forming" the electrodes in this manner, and the fact that the poroxide in its spongy nature disintegrates or becomes readily detached from thelplates, renders this bat-

and the fact that the peroxide in its spongy nature disintegrates or becomes readily detached from the plates, renders this battery practically valueless. No further progress of importance scems to have been made in the art until 1880, when a Frenchman by the name of Camile Faure bit upon the idea of giving the plates increased active surface by mechanically applying the active material as a substitute for the spongy peroxide produced by the tedious process noted. He coated his plates with a covering of red lead, in the nature of a paste, and retained it in in the nature of a paste, and retained it in blace by felt strips. In this way the process of forming was materially cheapened, and a attery was formed at once very susceptible

of forming was insterially cheapened, and a battery was formed at once very susceptible of being charged quickly and of such capacity as was desired.

This invention created a furor in the art, and at once inventors in all parts of the world were inspired with a wonderful energy to make advances in this seemingly promising field.

Much was promised, and bright indeed appeared the future of Faure's seemingly wonderful discovery, but, however bright this future has appeared, no one has yet reached the desired goal.

No one ever spoke truer words than did Niandet, in his valuable work on primary and secondary batteries, when he said, "No one knows the chemistry of batteries." It may be to the discredit of the chemical world that such is the fact, but whether or no this be true, no fact is more palpable than that secondary batteries are a failure because we cannot know their peculiarities, chemical or otherwise. Eminent men of science have given much thought and time to this line of electrical apparatus, and to-day more than 150 patents are found in the records of the United States patent office, but we doubt if any one of them possesses all the merits needed to make the storage of electrical potential a success.

Among thier many defects may be men-

needed to make the storage of electrical potential a success.

Among their many defects may be mentioned disintegration, or falling to pleces; making, or short circuiting, "needing," or forming of the "lead tree," whereby the cli ments are short circuited; the formation of deleterious or disagreeable gases, and leakage due to unknown causes, often to local circuits in the plates, &c.

During the years 1881, 1882, and 1883 there was unitring energy displayed in this line of invention, but for the past two years the patent office has not received on an average two applications per month, and

average two applications per month, and we have little hope for any material pro-gress in the art in the immediate future.

TRLEGHAPHS. Scon after Franklin's experiments in electricity the attention of man of learning was given to the transmission of informa-tion by its use.

The first attempt was in the direction o-

the decomposition of water into its compo-nent gases, oxygen and hydrogen. A bat-tery was connected at the transmitting sta tery was connected at the transmitting sta-tion to a series of wires, one for each letter of the alphabet, running to the receiving station and through a tank of diluted sul-phuric acid and water, each wire being bro-ken at a point within the liquid. On closing any particular key at the transmitting sta-tion and hydrogen bubbles ascended in the liquid, indicating the character signaled. A common return wire answered for all the ommon return wire answered for all th

direct wires.

This apparatus was, of course, impracticable. It was not until 1840 that Prof. Morse brought out the new famous Morse system so familiar to all that a description

Morse brought out the now famous Morse system so familiar to all that a description is not necessary here.

It was his happy thought of utilizing the energy of an electro-magnet that gave us the Morse telegraph. By his system of electro-magnetic relays at local or way stations, and of repeaters at main stations, intercommunication between all parts of the world became possible.

This invention opened up a large field. The next step was by Bain, who gave us the automatic or chemical telegraph, the use of which resulted in the famous suit of O'Relly vs. Morse, in which the Supreme Court of the United States decided that Morse's eighth claim was broadly for a principle, and that he could not cover all modes of transmitting information by electricity. Bain caused his characters to be perforated in a steip of paper, then caused this strip to be drawn under a metal stylus located in a telegraph lie, thus making and breaking the circuit running to the receiving station where another stylus resteil upon a paper strip sensetized with a chemi-

cal rgent which adapted it to be discolored by the electrical current.

Hence the characters were reproduced at the receiving station by the direct effect of the current; while Alorse utilized electro-magnetism. The principle or mode of operation was, therefore, totally different. Morse's idea of utilizing the power generated by electricity in an electro-magnet readily suggested to ingenious persons the idea of operating mechanism for printing characters at a receiving station, and as a result printing telegraphs sprung into existence. A large class of instruments of this kind existe, and much ingenuity has been exhibited. The well-known "stock tickers" found in all stock exchanges are of this class of invention. The simplest form of apparatus embraces a main line carthed at both ends, with a battery located at the transmitting station. A rotatory arm rotated by clock of other mechanism is attached to a vertical shaft which carries a device for making and breaking the girent as mediane in them. shaft which carries a device for making and breaking the circuit as many times as there are characters to be transmitted on making one complete revolution of this

shaft.

Located above the rotatory arm is a dial having keys bearing the characters to be transmitted, said keys being adapted to be projected into the path of the rotatory arm so as to stop it and send a prolonged current to the

rent to line.
At the several receiving stations are lo At the several receiving stations are located two electro-magnets, one of which is more sensitive than the other, or as expressed in electrical terms is not so slongish as the other. This sensitive magnet actuates an armature on each make and break of the circuit, which armature has attached to it an escapement wheel for controlling the rotation of a type wheel located on the same shaft as this escapement wheel. Beneath the type wheel, which has on its lateral face as many characters as there are keys on the key board or dial at the transmitting station, is located a paper strip normally out of contact with the type wheel, and borne by a printing arm attached to an arrasture actuated by the second electro-magnet on each prolonged make of the circuit occasioned by a stoppage of the rotating transmitting arm.

The type wheel is inked by an inking

sach prolonged make of the circuit occasioned by a stoppage of the rotating transmitting arm.

The type, wheel is inked by an inking
relier resting on its upper surface. Now
on starting the transmitter each time the
circuit is made and broken the type wheel
is advanced one step.

To print any particular letter its correspecifing key is depressed until the arm is
stopped in its rotation. A prolonged stoppage actuates the second or sluggish printing magnet and causes its armature to lift
the paper strip and print the desired letter.
On receasing the key the printing lever
actuates by pawl mechanism a feed apparatus and advances the paper one step
ready for the next letter.

If several such receiving apparatus are
located on one line it becomes necessary to
provide unisoning devices for keeping all
the type wheels at unison, or so that the
same letter will be printed at each impression.

To this end contrivances are smoothed

sion.

To this end contrivances are supplied which throw all the type wheels to a com which throw all the type wheels to a complete the supplied to the type wheels to a complete the type wheels the type wheels to a complete the type wheels the type wheels to a complete the type wheels the type men er zero point once in each complete revolution er once after each impression, as

These devices display much ingenuity. These devices display much ingenuity, particularly in the class of printers known by the title of "double type wheel." In the double type wheel instruments one type wheel prints letters and the other figures, and usually each wheel is actuated by a magnet in an independent line, and the printing is effected by shifting apparatus for tifrowing the lever first against one wheel and then its fellow, thus printing letters or figures at the pleasure of the transmitting operator. Mr. Edison has doubtless done more to

Mr. Edison has doubtless done more to simplify and make complete the modern printer than any other inventor, and more patents have been granted him upon such apparatus than any other person.

The invention of the speaking telephone almost stopped invention upon printers, for the reason that it supplied a want which they could not meet, viz., an actual and immediate interchange of thought.

But little is now done in this direction, and competition is not very active. There are about 300 patents covering all kinds of electrical inventions appertaining to this type of apparatus.

type of apparatus.

Following the improved printers came the duplex and quadruplex instruments for transmitting two or more messages over one wire simultaneously in the same or op-

transmitting two or more messages over one wire simultaneously in the same or opposite directions.

It had been known as early as 1853 that two messages could be transmitted over one wire at the same time by differentiating the circuits at both stations; that is to say, by winding one leg of the receiving electro-magnet with the main line wire and the other leg with an artificial line of a resistance equal the main line, but in such direction that a current sent from the transmitting battery and the home station would cause said battery to have no effect upon the home instrument, and would actuate the distant instrument while both instruments would respond for signals sent simultaneously by both the keys.

Steinheil devised such an arrangement, but it was only adapted for short distances, not excluding thirty miles.

It was not until 1873, however, that J. B.

It was not until 1873, however, that J. E.

It was not until 1873, however, that J. B. Stearns hit upon the happy idea of equalizing the statical or charging conditions of the main and artificial lines of a duplex line, locating a statical equalizer in the nature of a condensor in the artificial line at each station, for overcoming false signals due to the unbalanced statical condition of the main and artificial lines on long circuits, that duplex telegraphing became a success for long distances over thirty miles.

Mr. Stearns obtained patents in 1875 covering this ingenious contrivance, and the Western Union Telegraph Company purchased them for a handsome compensation. It is upon these patents that suft has been recently brought in New York by the Western Union against the Baltimore and Ohio Telegraph Company. The patents if sustained are very valuable, and cover all successful duplexes for long distances.

In 1873 and 1874 Messrs, Edison and Nicholoson turned their attention to quadruplex

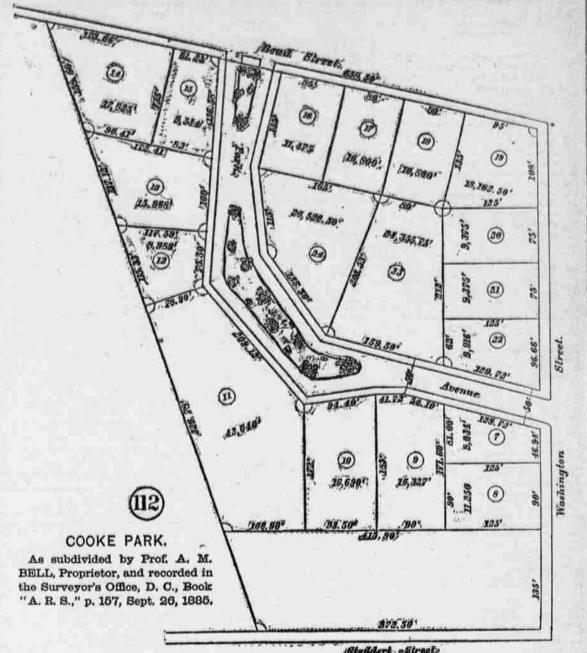
olson turned their attention to quadruplex telegraphy, each independent of the other. Their inventious involve the idea of send-Their inventions involve the idea of sending one message by current reversals and another by changes of current tension or pressure. To this end a pole key at the transmitting station sends currents of alternate direction as it is depressed and raised, thus actuating a polar relay magnet at the receiving station, whose armature remains in one position for a current of one direction and is caused to assume another position on reversal of the direction of the current. This armature by its vibrations opens and closes a local battery circuit through a Morse sounder. Another key at the transmitting station causes currents of greater Morse sounder. Another key at the transmitting station causes currents of greater strength to be sent to line which actuates a neutral or common magnet relay, whose armature is held back by a strong spring for the currents which actuate the polar relay, the spring only being overcome entirely when the intensity key is actuated alone or when being heave are actuated to eather. This relay also actuates a local Morse read-

If this system is differentiated, that is duplexed in the manuerabove noted, it doubles its capacity, so that four messages may be sent at one time—two in each direction. Mr. Edison has also devised a sextuplex telegraph for sending six messages at once. In this apparatus one message is sent by current reversals, one by current tension, and a third by a reed vibration; and by differentiation, as is above shown, three more messages are sent.

In multiplex telegraphy much has been done with reed a tuned to vibrate in unison, but not with very gratifying success.

The letest improvement in the line of multiple transmission is that known as the unison rotating system, where any number of messages are transmitted. An arm carrying a contact brush is caused to rotate over a scries of contacts at each station. If this system is differentiated, that is du-

over a scries of contacts at each station. The series of contacts are divided into segments, so that each pair of operators transmitter, and receiver have possession of the wire for a fraction of a revolution



The above brautiful ground has been subdivided as shown in the above plat, and is offered for sale in lots.

Frices: Lot 19, 40c per foot; Lots on Washington street, 25c per foot; Lots on Road street, 35c per foot; Interior Lots 15 to 20c per foot.

For residence sites or for investment nothing better is offered in the real estate market. Plats furnished on application to

FITCH, FOX & BROWN.

Real Estate Brokers, 1437 Penna. Avenue.

Tots 10, 14, and 15 have already been sold.

account on the many improved only such general inventions have been named as indicate great step, or advances in the sit.

There has been much done in railway car telegraphs, repeaters, relays, and sounders, &c., but inasmuch as these are in the nature of details under the more generic telegraphy, we cannot treat them title of telegraphy, we cannot treat them here.
The next article will treat of electric

lighting, after which this series will con clude with two papers upon "the electric telephone and why it talks." BINTS FOR THE HOUSEHOLD.

[Indianapolis Journal.] Square dinner plates do not appear to grow in inshien, as was expected, and several ob-cettons against them are urged by house-keepers. Crockery men do not always know when to let well enough alone. Yellow sateen makes an elegant table scarf, and with broad bunds of crimson plush and deep embroidery in various colors above the band, it is toned so that there is nothing glaring or too pronounced about it.

Serviceable and Inexpensive portieres are made of horizontally-striped, double-faced can-ton fiannel, or "fashion drapery," as it is often called. Various designs in feather and blanket stitch are embroidered on the stripes with crewels.

with crewels.

An ounce of nitrate of soda dissolved in four gallons of water is said to be a good atimulant for luths. It should be applied twice a week after the flower spikes show themselves. A plut of soot, tied up in a cloth and immersed in the same quantity of water, is also an excellent and safe stimulant.

and safe stimulant.

The color of walls in house decoration should relate to all objects placed against them. "We can make our walls red," sain a lecturer ou this subject, "a warm, physical; or bine, which is cold and mental; or yellow, which is gontal and sunny, and which is best in the entire scale to bring all others into harmony." Nice table mats can be made of paim leaf fans. Cut off the handles and trim the fan to suit your taste, both in size and shape, blud the edge with crimson worsted braid, and next to the braid, or half an inch from it, work a row of heavy cross-stitch or double-briar stitch in crimson zephyr. They make pretty and serviceable maps.

A pretty picture frame may be made at small cost by having the frame cut from common pine, and covering it with some coarse lace. Have the lace adjusted perfectly smooth, and, when the muchage is quite dry, varnish it; when this is dry, put over it a coating of gold paint. The result will resemble an expensive gilt frame, and will delight you.

A useful and protty scrap bag is made of one of the handsomely bardered fringed towels that may be purchased at any linen store. It is cut in half, the norder ends and sides sewed firmly together and a hem and a casing for elastic sewn at the top. A bow of old gold and rardinal ribbons is placed near the top, and ribbons of the same color are used to suspend it by.

Bi-carbonate of soda (baking soda) affords speedy relief for external burns, and should be kept his every house. Apply the soda to the burned part and moisten well, binding a welloth over it. In nearly all cases the relief is almost instantaneous. If one application should not relieve, make a second after a few minutes. It has been found that burns heal more rapidity by this method of treatment than by any other.

by any other.

A "bandy board" is made of a white holly board the size of a sheet of note paper. Noncrous hooks are fixed in this for the safe keeping of scissors, keys, button-hooks, and su h thious. A painted wine wanters among the books and so entangled among the hooks and vine iraves that it requires some ingenuity to decipher them, are the words?

"Here you only have to look.

To find your keys and button-hook." To find your keys and collode-look.

Try hominy cakes or croquettes made thus:
To one quart of boiling water add a teaspoon
int of sair, str in gradually a heapinghalf pint
of the linest hominy; boil three-quarters of an
hour, and ruit it on the back of the range
where it will remain hot an hour longer; then
put in a large bowl and add the beaken yolks
of two eggs, mix it thoroughly, and when cold
shape into cones; dip the cones in beaten eggs,
red in crumbs, and fry in boiling fai.

rell in crumbs, and fry in beiling fai.

For what is sometimes called snow cake take a cupful of granuitated sugar, one table pounful of butter, two eggs, one cupful of flower, and a teaspoonful of baking powder, and two tablespoonfuls of saveet milk. Bake in a square pan, and cut into little squares when cool. For the snow take one cupful of showed and sifted sour apples, one cupful of white surgar and the white of one cgg. Beat all thousaghly tegether, and spread between your squares of cake.

MME. ZADOC PORTER'S CURATIVE COUGH BALSAM

over the message strip at a given rate. It's pivoted and is connected to the line, and current from a battery connected from earth to a metal cylinder below the letter strip is thus sent to line by impulses as the strip is drawn along. A sensitized paper is drawn over a duplicate metal cylinder at the receiving station, and another metal stylus connected to line and to carth at said station is vibrated in unison with the first stylus. Each interruption of the circuit is indicated by discoloration of the paper, and the message appears as the largest embraced in the electrical division, and for the reason that it is one of the oldest ambjects to which electricans turned their attention. It would be impossible in a brief article like this to give a detailed account on the many improvements, and only such general inventions have been named as indicate great step, or advances in the art.

There has been much done in railway

The governor gave good reasons why the colored people should own lands and build better houses and advance themselves in the knowledge of husbandry. His speech was a pleasant and instructive one, and was

the knowledge of husbandry. His speech was a pleasant and instructive one, and was lightly appreciated by the large crowd of colored people who assembled to bear him. He expressed himself as astonished at the remarkable improvement made by the colored people of the state in twenty years. The procession each day was large and attractive. On the 11th an address was delivered by E. L. Thornton, eag., of Fayetteville, N. C., a recognized representative of the rising manhood of colored North Carolinians. The subject of the discourse was "The Problem of the Hour."

In solving this much-vexed problem Mr. Thornton set forth the potent necessity, and urged upon his people the need of learning the one important lesson of "lielping themselves." He said they might gather from present circumstances in what they had failed to do, and what was yet necessary to be done. He urged that the negro is here to stay, i. c., he may be considered a permanent institution, and that any amount of honest labor, economy, and frugality should not be spared to advance themselves in the dignity of American citizenship. Fresident Cleveland was obviously pictured us a revised edition of republicanism. Pleasant mention was made of ex-Govs. Vance and Jarvis, and also of Gov. Scales.

Mr. Thornton's discourse was pointed,

publicanism. Pleasant mention was made of ex-Govs. Vance and Jarvis, and also of Gov. Scales.

Mr. Thornton's discourse was pointed, his argument foreible, and his delivery such as to clearly display his gracefulness and reflected enviable and lasting credit upon himself and his race. Applause was loud and timely. The annual oration was delivered on the 12th by Rev. John A. Savage, of Louisburg, N. C., a Christian, a scholar, and a gentlemen.

The colored people have every cause to be proud of their seventh annual fair. It was beyond doubt the best one yet held. The articles shown were meritorious and reflect credit upon the race. There were over 400 entries in floral hall, 100 in agricultural hall, 70 of poultry, 0 of horses, 8 of estitle, 13 of hogs, and 8 of cotton. In the line of poultry this last exhibit beats the resord there being about 200 specimens. All the fancy breeds of poultry were shown, the collection Leing unquestionably the best in the state at any fair. A great curiosity was that of a cross between a guinea and a chicken. Seven evers were produced, of the state at any fair. A great curiosity was
that of a cross between a guinsa and a
chicken. Seven eggs were produced, of
which two hatched, and the two hybrids
were the result. These hybrids lay well,
and the experiment may develop the fact
that such a cross will produce good fowls.
Floral hall was richly decorated with
quiits and specimens of woman's handiwork.
The exhibits of oil painting and crayon drawing by colored artists were creditable. No
better specimens of farm products have been
at any time exhibited in the state than those
seen in farmers' and domestic hall. The
white citizens of the state attended the fair
in large numbers, and have ever shown

white citizens of the state attended the fair in large numbers, and have ever shown their appreciation for the worthy enterprise by their liberal donations.

The colored people are carnest in their support of this fair and manifest a great willingness and determination to cultivate themselves and in every way prepare to make useful and agreeable citizens. The state furnishes the grounds, "Camp Rus-sell," free of charge, and douates \$500 an-nually to the Industrial Association.

Preparing to Encounter Disease-Preparing to Encounter Disease. The prevalence of malarist disorders being dependent upon withined conditions of almosphers and water is, in certain regions, of course, inevitable. The grand question, therefore, presents itself to every resident of a fever stricken locality is, "What means shall I adopt to escare the dreaded scourge". For a third of a century lissetter's Stomech litters has been the embedded answer to this question. In thickly repulated, and sparsely settled districts allie, in town and in country, it has afforded constant protection against malarial infection to those who have used it. It cradicates and prevents, with equal certainty, fever and ague calls and multiples also the permittions after feeling using persistently the birthid alkaloid siphale of quintine. It also remodes, with the outphases, dyspensis, liver complaint, convilpation, debility, and rheumatism.

to the

25, 50, and 75c. A BOTTLE. The 75-cent bottle contains four times as much as the 25-cent bottle. ONE OF THE BEST, CHEAP-EST, AND MOST EF-FECTUAL OF REMEDIES. FOR

COUGHS, COLDS, CROUP, WHOOPING COUGH ASTHMA, AND ALL AFFECTIONS OF THE THROAT AND LUNGS. A Purely Vegetable Expectorant; not a violent emedy, and very agreeable to the taste,

DR. ZADOO PORTER'S MEDICATED STOMACH BITTERS

DYSPERSIA, LOSS OF APPETITE, ALL BILL-AS A GENERAL CORRECTION OF THE STOMACH BOWELS.

PRICE 25 AND 50 CENTS A BOTTLE.

ARE STILL TRIUMPHANT. For affect years they have steadily gained in wor, and with sales constantly increasing have scome the most popular Corset throughout the favor, and with sales constantly increasing have become the most popular Corset throughout the United Shales.

The G quality is warranted to wear twice as long as ordinary Corsets. We have lately introduced the G and H II grades, with Extra Long Walet, and we can finish them when preforms.

The last meliat item when preforms. Great Fairs, The last needs received is for First Degree of Merit from the late Exposition heart at New Orlean.

Then, the process of patents have been found orthogonal to the control of the Lieuwith of the Carlon of the Carlon

Thomson, Langdon & Co., New York.

CONTAGIOUS! I am a netive of Engined, and while I was in that country I contracted a terrible blood polone, and for two years was under treatment as an out-door pa-tient at Nottingham Hospital, Eurland, but was not cared. I suffered the most aponising pains up my

tient of Nottingham Hospital, Eurland, but was not cared. I suffered the most agonizing pains in my boars, and was covered with sores all over my boars and links. Finally I completely lost all hope in that country, and salled for America, and was treated at Bloosever in this city, as well as by a prominent physician in New York having no connection with the hospitals.

I saw the advertisement of metric specific, and I determined to drive it a trial. I took six boatles and I can say with great by that they have gured unentiely. I am as sound and well as I ever was in my life.

Saw York City, June 12, 1886.

In March of last year (1884). I contracted blood poison, and being in Savannah, (is, at the time, I went into the booting theory for treatment. I suffered very much from thematican at the save time, for the result of the following to the result of the re

Treatise on Blood and Skin Diseases mailed fre THE SWIFT SPECIFIC CO.,

N. Y., 157 W. 28d st. Drawer S, Atlanta, Ga. DR. FONTAINE'S PREPARATION WILL DEVELOP A BEAU-TIFUL FORM in sixty care the effect of which is personaution and usually discrepance in the N. Sandan

manage Pontaine, 19 East 14th St., N. V. K HYES & CO., WILLARD'S HOTEL STABLES. Corner Fourteenth and D streets northwest,

ar Branch Office at the Arlington.

The b